IN THE SPECIFICATION

Page 1, amend the paragraph beginning at line 16 as follows:

The dramatic increase in desktop computing power driven by <u>Intranet-based</u> ~~intranet-based~~ operations and the increased demand for time-sensitive delivery between users has spurred development of high-speed Ethernet LANs. 100BASE-TX Ethernet, using existing category-5 copper wire, and the newly developed 1000BASE-T Ethernet for <u>gigabit/s</u> ~~Gigabit/s~~ transfer of data over category-5 copper wire require new techniques in high speed symbol processing. Gigabit per second transfer can be accomplished utilizing four twisted pairs and a 125 megasymbol/s transfer rate on each pair where each symbol represents two bits.

Page 1, amend the paragraph beginning at line 35 as follows:

One system of transferring data at high rates is Non Return to Zero (NRZ) signaling. In NRZ, the symbol alphabet {A} is {-1, +1}. A logical "1" is transmitted as a positive voltage while a logical "0" is transmitted as a negative voltage. At 125 M symbols/s, the symbol rate required for <u>gigabit</u> ~~Gigabit~~ transfer over four category-5 wires, the pulse width of each symbol is 8 ns.

Page 2, amend the paragraph beginning at line 7 as follows:

Another example of a modulation method for high speed symbol transfer is MLT3 and involves a three level system. (*See* American National Standard Information <u>System,</u> ~~system,~~ *Fibre Distributed Data Interface (FDDI) -Part: Token Ring Twisted Pair Physical Layer Medium Dependent (TP-PMD)*, ANSI X3.263:199X). The symbol alphabet for MLT3 is {A}={ -1, 0, +1}. In MLT3 transmission, a logical 1 is transmitted by either a -1 or a +1 while a logic 0 is transmitted as a 0. A transmission of two consecutive logic "1"s does not require the system to pass through zero in the transition. A transmission of the logical sequence ("1", "0", "1") would result in transmission of the symbols (+1, 0, -1) or (-1, 0, +1), depending on the symbols transmitted prior to this sequence. If the symbol transmitted immediately prior to the sequence was a +1, then the symbols (+1, 0, -1) are transmitted. If the symbol transmitted before this sequence was a -1, then the symbols (-1, 0, +1) are

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transmitted. If the symbol transmitted immediately before this sequence was a 0, then the first symbol of the sequence transmitted will be a +1 if the previous logical "1" was transmitted as a -1 and will be a -1 if the previous logical "1" was transmitted as a +1.

Page 9, amend the paragraph beginning at line 28 as follows:

To achieve one gigabit per second communications, a <u>Gigabit Ethernet</u> ~~gigabit ethernet~~ transceiver needs to achieve a throughput of 250 Megabits per second over each of four transport wires 103-1 through 103-4. Therefore, at a 125 MHz baud rate, two bits must be transmitted at each sample time across each wire of cable 103. Although a PAM-5 system is applicable, a four level PAM system, for example, does not provide redundancy which allows for error correction coding necessary to achieve a bit error rate (BER) of 10^{-10}, as required by the Gigabit Ethernet standard. *See* Gigabit Standard.

Page 10, amend the paragraph beginning at line 3 as follows:

In addition, extra channel symbols are needed to represent <u>Ethernet</u> ~~ethernet~~ control characters. Therefore, five level PAM (PAM-5) with either a parity check code or trellis coding is often utilized in Gigabit Ethernet transmission. According to the Gigabit <u>Standard,</u> ~~standard,~~ the trellis code is the only coding utilized. Alphabets having more than five level 1-D symbols may also be utilized for <u>gigabit</u> ~~Gigabit~~ transmission while achieving the required BER.

Page 11, cancel the revision made to the paragraph beginning at line 3 via the Amendment submitted 15 September 2003 and, in place of that revision, amend the paragraph beginning at line 3 as follows:

Trellis encoding in a conventional 4-D eight state code is described in Part II, Table IV of G. Ungerboeck, <u>"Trellis-Coded</u> ~~"Ungerboeck-Coded~~ Modulation with Redundant Signal Sets, <u>Part I: Introduction",</u> *IEEE Communications Mag.,* <u>vol. 25, no. 2, pp. 5 - 11, February 1987, and "Trellis-Coded Modulation with Redundant Signal Sets, Part II: State of the Art",</u> *IEEE Communications Mag.,* <u>vol. 25, no. 2, pp. 12 - 21, February 1987</u> ~~Part I and II", *IEEE Communications,* vol. 24, no. 2, pp. 5-21 (Feb., 1987)~~ (hereinafter <u>collectively</u>

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"Ungerboeck"). ~~Ungerboech").~~ An embodiment of an eight state trellis encoder 200 similar to that described in Ungerboeck is shown in Figure 2. Trellis encoder 200 receives eight bits, bits 0 through 7, and outputs 9 bits, bits 0 through 7 plus a parity bit, provided that TX_CODING is set to 1. The parity bit is produced from a rate 2/3 memory 3, systematic convolutional encoder 201.

Page 29, cancel the revisions made to the paragraph beginning at line 26 via the 15 September 2003 Amendment and, in place of those revisions, amend the paragraph beginning at line 26 as follows:

Figure 9 shows the equalization and decoder sections (see, for example, equalizers ~~see Equalizers~~ 505-1 through 505-N ~~505-4~~ and decoder 507 of Figure 5A for the case in which N is 4) ~~Figure 5, for example)~~ of a 4-D receiver ~~a 4D receiver~~ 910. The equalization is accomplished using four decision feedback equalizers, one for each of the four input channels shown. Again, one skilled in the art will recognize that a receiver can have any number of input channels and that a 4-D receiver is shown here for example only. In Figure 9, receiver 910 includes 4-D decoder 900. Although decoder 900 is shown as a parity ~~Parity~~ code decoder, it is understood that decoder 900 can be any 4-D decoder. One skilled in the art will recognize that 4-D decoder 900 must correct symbols within a single clock cycle so that the results can be fed back through feedback sections (or taps) ~~FB taps~~ 811-1 through 811-4 to correct symbols $a'_{k,1}$ through $a'_{k,4}$, respectively.

Enclosed is a corrected substitute specification that incorporates all of the revisions to the specification. This consists of the above revisions and all the earlier revisions, i.e., those presented in the amendments submitted 15 September 2003, 15 October 2003, 3 December 2003, and 10 February 2004 for revising the text, to the extent that the earlier revisions have not been superseded by the above revisions. The page numbers of the corrected substitute specification begin with the letter "C" to help distinguish the substitute specification from the specification as originally filed and from the substitute specification submitted with the 15 September 2003 Amendment. Also enclosed is a marked-up version of the original specification annotated in accordance with 37 CFR 1.125(c) to indicate all the specification changes, both the above changes and the earlier-made changes.

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